ERCB Energy Resources Conservation Board

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Directive 027—Draft

Draft revised edition, February 25, 2009

Shallow Fracturing Operations—Restricted Operations

The Energy Resources Conservation Board (ERCB) has approved this directive on Month XX, 2009.

<original to be signed by>

Dan McFadyen
Chairman

The recent trend in Alberta to develop shallow gas reservoirs less than 200 metres (m) deep using high fracture volumes, pump rates, and pressures during shallow fracturing operations prompted the ERCB to review the technical design requirements and regulatory options. The ERCB initially imposed shallow fracturing controls on January 31, 2006, with the issuance of *Directive 027: Shallow Fracturing Operations—Interim Controls, Restricted Operations, and Technical Review.*

As part of an ongoing ERCB commitment to maintain effective regulatory requirements, a Multistakeholder Shallow Fracturing Steering Committee was formed. The committee was supportive of the initial action taken by the ERCB to manage shallow fracturing, but did recommend that the ERCB commission a study of available fracturing data to assist in the development of science-based shallow fracturing requirements. The ERCB is instituting the following additional or amended requirements after considering the committee recommendations.

What's New in This Edition

This edition of the directive is effective XXXX, 2009, and includes the following revisions:

- The 25 m vertical restriction for a proposed fracture treatment below the total depth of a water well within 200 m will be increased to 50 m (see Figure 1). Note that the current 200 m horizontal restriction from existing water wells has been deemed acceptable and remains the same.
- An additional fracture treatment restriction is being imposed from the bedrock surface to a vertical depth of 50 m below the bedrock surface (see Figure 2).
- Maximum injection volumes of nitrogen will be capped at 15 000 cubic metres per metre of coal, unless the licensee has prior ERCB approval.

Fracture Treatment Controls

The ERCB expects licensees to conduct all drilling and completion operations at any depth with technical due diligence and in compliance with ERCB requirements. The ERCB also believes it is prudent for industry to carefully design and monitor fracturing operations shallower than 200 m to ensure protection of water wells and shallow aquifers.

Effective January 31, 2006, licensees must not conduct fracturing operations at depths less than 200 m unless they have fully assessed all potential impacts prior to initiating a fracturing program. Licensees must be prepared to provide the ERCB with an assessment demonstrating that a complete review was conducted and all potential impacts were mitigated in the designed fracture program. The ERCB requires such an assessment to include, as a minimum,

- the fracture program design, including proposed pumping rates, volumes, pressures, and fluids,
- a determination of the maximum propagation expected for all fracture treatments to be conducted,
- identification and depth of offset oilfield and water wells within 200 m of the proposed shallow fracturing operations,
- verification of cement integrity through available public data of all oilfield wells within a 200 m radius of the well to be fractured, and
- landholder notification of water wells within 200 m of the proposed fracturing operations.

Effective XXXX 2009, the following amended or additional restrictions apply:

1) Fracturing Near a Water Well

When a proposed well is within a **200 m** radius of water well(s), licensees are prohibited from conducting fracturing within **50 m** vertical depth of the water well (see Figure 1). The ERCB believes the current 25 m vertical depth limit has been protective to date, but an increase to 50 m reflects the use of a consistent conservative safety margin.

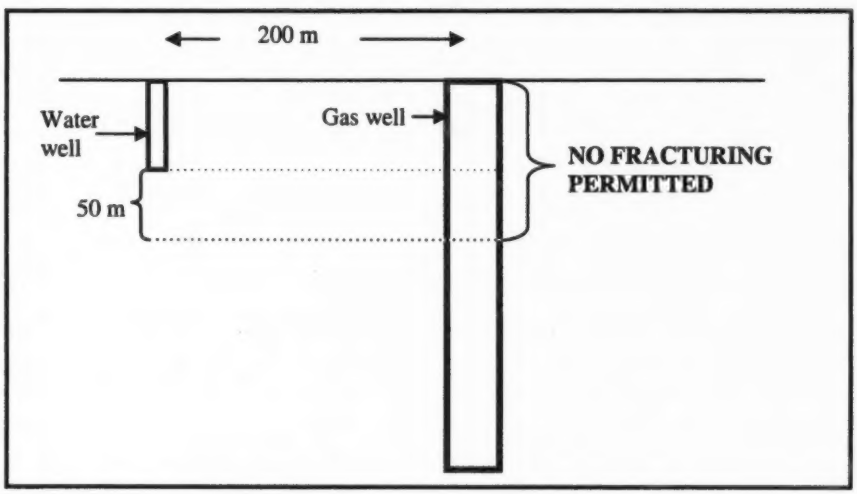

Figure 1. Fracturing near a water well

2) Fracturing in Proximity to Bedrock

No fracture treatments can be carried out within **50 m** vertical depth of the bedrock surface. Bedrock is consolidated rock underlying the unconsolidated glacial or drift material.

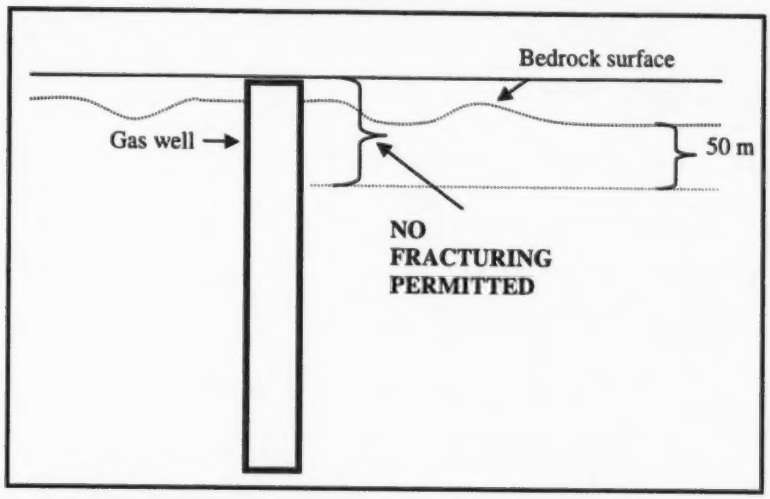

Figure 2. Fracturing in proximity to bedrock

3) Nitrogen Fracture Pumping Volume Limitations

Shallow fracturing must not use more than 15 000 cubic metres of nitrogen per metre (m^3/m) of coal without prior ERCB approval. Note that currently the average volume of nitrogen used in Alberta during shallow fracturing is 4200 m^3/m of coal.

In addition, all fracture treatments must

- use only non-toxic fracture fluids above the base of groundwater protection (licensees must supply the ERCB with the composition of the fracture fluids upon request);
- be designed so that no zone containing non-saline water is contaminated; and
- not reach any other wellbore, including both oilfield wells and water wells, at any point during the process of fracturing.

Licensees must establish and maintain on file the depth of bedrock for all wells where shallow fracturing has occurred.

Note that as buried glacial channels and valleys may exceed 200 m in depth, bedrock surface might be greater than 200 m in depth. Fracturing must not occur within 50 m of the bedrock surface, even if depth to bedrock is greater than 200 m.

The above restrictions apply to both new wells and recompletion of existing wellbores.

Compliance Assurance

The ERCB will conduct random and select compliance assessments for all requirements listed in this directive. The licensee must provide any supporting information related to these

compliance assessments within five working days of a request by the ERCB. The ERCB's enforcement process is specified in *Directive 019: ERCB Compliance Assurance—Enforcement*. A list of risk-assessed noncompliances is available on the ERCB Web site under Home : Industry Zone : Compliance and Enforcement : Risk Assessed Noncompliance.

Questions regarding this directive should be directed to the ERCB Well Operations Section by telephone at 403-297-5290, by fax at 403-297-2691, by e-mail at ercb.welloperations@ercb.ca.